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ABSTRACT

As part of a series of implementing competency-based education, this monograph presents guidelines for development and utilization of performance learning modules. The relative merits of individualized modular learning of group instruction are discussed prior to a description of the two basic types of learning modules: self-contained and directional modules. The next section discusses the applicability of various educational tools, including performance objectives, to module-oriented instruction. The functions of each of the seven components of a learning module are then discussed, i.e., the cover page, introduction, list of performance objectives, pre-test, description of learning experiences, post-test, and references. Figures are then presented which indicate the order in which these components should be developed and which provide criteria for evaluating a learning module as a whole as well as its component parts. The final section provides 12 guidelines for the application and management of a module system, including: set content parameters: codify performance objectives: designate delivery strategy: adapt the learning environment: provide faculty and student orientation: purchase commercially available modules, develop a module, or solicit student-written modules: design a monitoring system: set time frames: and continually evaluate and adjust the module. (JP)

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DEVELOPING AND USING PERFORMANCE MODULES

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This series of monographs includes the following:

1. Using Performance Goals
2. Using Performance Objectives
3. Developing a Performance Syllabus
4. Evaluating Performances
5. Motivating Performance Learning
6. Developing and Using Performance Modules
7. Addressing Affective Performance
8. Remediating and Enriching Performance Learning
9. Managing a Performance On The Job
10. Maximizing Teaching/Learning

This is one of ten monographs in a series relating to IMPLEMENTING COMPETENCY BASED EDUCATION IN COMMUNITY COLLEGES developed at Virginia Polytechnic Institute and State University. This project was developed under a grant to St. Clair County Community College and was funded by the Michigan Department of Education, Higher Education Management Services, Occupational Education Unit. Project #33B9-7447-2.

Developing and Using Performance Modules

This monograph was written to provide background information related to the development and use of performance modules. The term **module** was delimited by definition to denote a compact instructional device designed to guide learning and teaching. Emphasis was placed on the application of modules to a competency based learning and teaching delivery system. The various components of this monograph were tailored to produce an operational approach for use by instructors of competency-based education. The monograph components presented herein include the following:

Issues: Role of Modules

Relationships: Basis of Modules

Development: Parts of Modules

Critique: System Soft Spots of Modules

Application: Management of Modules

Outreach: Support References on Modules

Summary: Modules in Perspective

Issues: Role of Modules

Several foundation issues underlie the use of modules in the learning/teaching delivery system. The study of the issues through research, disciplined debate, and empirical application has helped to identify the problems. However, a definitive prescription for use of modules must, at best, be viewed as situational. The issues discussed below were penned to provide a context from which a commitment for the development and use of modules might evolve. The list was not intended to address all of the possible issues. One should feel free to accept, reject, revise, or add to the list.

Individualized Instruction

Most instructors can identify with the concept of first assessing a student's current level of competency and then taking the student as far and as fast as possible. One approach for delivering this concept is individualized instruction. The approach can be used if one can describe the current status of the student and then prescribe the optimal learning/teaching activities. Thus, the only obstacles are the description and the prescription! Correct? Simple? Huh? Why, of course not! There are a multitude of variables within each of these

two elements, the least of which include assessment techniques, establishment of learning goals, identification of learning/teaching activities, motivation of the learner, monitorship of learning, and final assessment. All of these variables, when accomplished, may produce the desired results or prompt some sort of recycle. Nevertheless, the operational definition of individualized instruction includes each of the aforementioned activities.

A module which delivers on the operational definition of individualized instruction can be developed. However, the big kicker becomes the number of modules required. Technically speaking, a module for each student times the number of competencies would be required. Impractical? Yes! Therefore, a compromise must be used if the instructor desires to utilize the concept. The principal compromise resides in the assessment function. The instructor may simply choose an assessment technique anywhere on a continuum from assuming that all students possess the same level of initial competence to elaborate testing of each student. It is the instructor's decision. A second compromise could be made regarding the number and depth of learning prescriptions. Again, the instructor may choose from an infinite set of alternatives represented on a continuum from one brief learning activity to a complex system involving a variety of required and optional learning activities. It is the instructor's decision.

You may be asking yourself, "Self, isn't that true whether I use a module or work with a student on a one-to-one basis?" If you answered with a yes, then you are correct. It is the same. The basic difference is that a module will force the process before contact with the student and will enable you to multiply your influences by the number of students who can effectively use the module at the same time. Much more could be said about each of the operational activities of individualized instruction. Even without more information one may conclude that modules can play an important compromise role in individualized instruction. However, one should not conclude that all modules are individualized and thereby believe that modules and individualized instruction are synonymous.

Individual Learning/Teaching

Several contemporary educational concepts are tangential to the notion of individual learning/teaching. Included among the concepts are mastery learning, open entry/open exit, self-paced learning, interest-keyed open classrooms, and schools without walls. In the

final analysis, individual learning connotes learning that is person independent and competence dependent. In other words, the learner should not be restricted because of the teacher or other students; the learner should be able to develop competence in direct proportions to the difficulty of the competency content.

Most of the barriers preventing individual learning are products of our past educational practices. The placement of the instructor as the center of learning/teaching; failure to group learners based on interest, ability, etc.; failure of instructors to trust student groups or individuals; inflexible schedules of class periods; and compulsory attendance rules are examples. These and many other examples are often cited as reasons to perpetuate the status quo of traditional group-oriented instruction. The use of these examples to manipulate the situation to meet one's unperceived self needs really mitigates against optimal learning/teaching. Hence, let's stop it.

Let one should believe that individual learning/teaching is better than group learning/teaching, let the record show it is purely situational; i.e., group instruction is optimal in some situations; individual instruction, in others. The really outstanding aspect of module-oriented instruction is that a module will enable the instructor to incorporate three delivery strategies--not one, not two, but three--into a class. The three are represented by traditional group instruction, individual instruction, and small group instruction. This is possible because the module can relieve the instructor from the roles of directional communicator and informational purveyor. If a module is in use, the instructor can engage in different activities with different students. The three operational configurations are provided in Figure 1 entitled, "Delivery Strategies."

No doubt your review of Figure 1 prompts you to say, "Big deal, I've learned and taught under those conditions." But, have you really? Was it deliberate? What was the role of the instructor? Who really had control? Who was dependent upon whom? What role did the content play? Think about these questions. It is hoped that you will conclude that there is no **one** best delivery strategy and that the situation will dictate the delivery strategy. Finally, it is hoped that you feel free to explore the related contemporary options of mastery learning, open entry/open exit, self-paced, interest-keyed open classrooms, and schools without walls. Really, the world of educational adventure awaits you. The decision is yours.

Self-Contained Versus Directional

The length of a module can vary. Many modules contain only a few pages while other modules may be book length. Likewise, the amount of time to complete a module may last a few minutes or span several weeks. The determining factor for the length in pages usually relates to the type of module.

A self-contained module includes all the learning activity material required to acquire mastery of the performance objective. A directional module includes directions specifying where the learner must go and what the learner must do to demonstrate mastery of the performance objective. Thus, a self-contained module will probably be several pages in length; a directional module, very few pages in length.

The length in time allowed to complete a module usually relates to the complexity of the content to be mastered as related to the learner's aptitude; it is independent of the number of pages. A highly technical competency may require extensive attention to detail. Naturally, a module addressing a technical competency might require a time investment of several hours, weeks, or months. This would be true whether the module is self-contained or directional.

A particular cognitive, psychomotor, or affective-oriented competency will mandate alternate types of modules. The particular competency will provide cues regarding the appropriate scope. Certain cognitive competencies might best be presented in a self-contained module requiring differing lengths of time whereas another cognitive competency might be better expressed through a directional module. Specifically, a new concept could best be described in a self-contained module whereas a concept requiring analytical synthesis might be better addressed through a directional module requiring extensive library research.

A given psychomotor competency might best be delivered in a lengthy sequential, problem-oriented, self-contained module. Business tax practice sets are examples. On the other hand, a module tailored to promote skill development might be more appropriate in a directional format. A short module designed to communicate the basic steps for welding metals might require untold hours of practice.

The affective competency poses special problems for the learner and instructor. This domain usually requires cognitive and psychomotor development. The selection of appropriate activities to address sequentially an interest, attitude, or value is crucial. This domain, more than others, is dependent upon the open acceptance by

the learner. There is considerable evidence to support the notion that the acquisition of affective competence must span extended lengths of time. Hence, one can quickly realize that the time length of affective modules will probably be rather long.

A typical self-contained module promotes considerable mobility and thereby enhances flexibility. Students appreciate the capability to learn in a variety of settings. Faculty members also benefit from self-contained modules by shifting the burden for learning to the student. The flip side of this issue, however, reveals that self-contained modules are usually boring for the students and difficult for the instructor to design. In addition, they are very expensive to reproduce and difficult to modify.

In the final analysis, the instructor must decide whether to develop and use self-contained or directional modules. Hopefully, the decision is based upon objective responses to the situational questions.

Several sample situational questions are presented below. With response to each respective question being yes, each question has then been coded SC (self-contained) or D (directional).

1. Are students free to move in and out of the traditional learning/teaching environment? (D)
2. Is the competency to be developed simple? (SC)
3. Is the competency cognitive based? (SC)
4. Is the competency skill based? (D)
5. Is the competency affective based? (D)
6. Can the content be provided in a succinct manner? (SC)
7. Is the competency development sequence dependent? (SC)
8. Will the competency development require extended student time investment? (D)
9. Does the competency development require instructor monitoring? (D)
10. Are module reproduction funds severely limited? (D)
11. Does the instructor have limited module development time? (D)
12. Is uniformity of student behavior crucial? (SC)
13. Will competency development be required at home or away from learning/teaching facilities? (SC)

The use of these questions will probably not yield a clear-cut decision. Nevertheless, the approach will indicate direction. For example, if eight of the thirteen questions (or approximately two-thirds) favor D, then the module should probably be directional. Yet, what's

wrong with a sort of self-contained/directional module? Nothing. The decision is yours.

Relationships: Basis of Modules

The origin of modules as defined in this monograph was difficult to establish. Modules, whether by name or function, have been in existence for many years. The wholesale use of modules in public post-secondary courses has been limited. The best early examples of modular instruction can be found in military training and correspondence schools. These two educational enterprises have done much to develop the necessary technology to implement modular instruction. One would also be remiss if mention were not made of instruction in the laboratory setting. Indeed, the use of consumable workbooks, along with laboratory projects, meets most of the criteria of modular instruction.

The key element for modular instruction is the performance objective, for it is this device that makes possible the communication of crucial information to the learner without oral instruction. Performance objectives enable students to learn as individuals rather than as a part of a group. As noted in another monograph in this series on using performance objectives, the performance objective must indicate (a) the conditions under which performance occurs; (b) the specific performance; and, finally, (c) the standards which will be used to evaluate performance. The performance objective clearly used establishes the "goal" and the "evaluation" elements of learning/teaching. The additions of pre-learning assessment, motivation techniques, and learning activities remain as the crucial elements of a module.

The recognition of the origin of the definition and function of modules, the importance of performance objectives, and the identification of the remaining crucial elements of a module permit examination of several related educational tools. This section of the monograph was written to place into perspective various educational tools with applicability for module-oriented instruction.

The relationships of these various aspects are presented in Figure 2 on page 8, which provides a two-dimensional matrix with the modular learning/teaching functions on one axis, a list of traditional educational tools on the other. Discussion of the functional elements may be found in the "Development: Parts of Modules" section of this monograph.

Scrutiny of Figure 2 reveals that the traditional educational tools,

RELATIONSHIPS

Modular L/T Functions: Educational Tools

TOOLS	FUNCTIONS										
	Capture Learner Attention	Advance Organize Learner	Pre-Assess Learner	Motivate Learner	Provide Learning Activity	Sequence Learning Activities	Establish Learning Conditions	Establish Learning Goal	Establish Evaluation Standard	Evaluate Formatively	Evaluate Summatively
Performance Obj.							X X X				
Textbook					X						
Programmed Learning					X X						
Assignment		X									
Simulation					X						
Project					X						
Workbook					X X						
Independent Study					X						
Game				X X							
Grade				X							
Quiz										X	
Test											X
Case Study				X							
Term Paper				X							
Report				X							
Experiment				X							
Monograph					X						

Figure 2

including performance objectives, will not meet all of the crucial functions of module-oriented instruction. Indeed, the traditional tools listed do not reinforce a given function to any great extent. One should feel free to add to, delete from, or revise the grid in Figure 2. However, one should not develop the false hope that the missing elements will be discovered. Rather, one would be better advised to experiment with combinations in a module-oriented approach. The next section of this monograph will present the background information necessary for developing a module. Lest one should fail to account, please recall the differences and similarities of self-contained versus directional modules, as noted previously in the example situational questions. Further, be advised that modules are expressly designed to create an option for individuals to learn without dependence on a group setting. Modules are not the panaceas for **all** things **all** the time; at best, modules may be the cat's meow for some things part of the time. You can make the decision.

Development: Parts of Modules

Eight basic questions provide the background information for writing CBE modules. They are: (a) What are the functional components of a module? (b) What is the cover page function? (c) What is the introduction function? (d) What is performance objective function? (e) What is pre-assessment function? (f) What is learning experience function? (g) What is post-assessment function? (h) What is the reference function?

There is an infinite variety of formats for modules; however, a workable format must move the learner logically and sequentially through a series of events that will enable the learner to meet specified performance objective(s). An ultimate test of a module in terms of whether or not it delivers is the problem-solving model. One may test any module by asking (a) where the learner is now, (b) where the learner is going, (c) why the learner is going, (d) how the learner is going to get there, and (e) when the learner will arrive. To accomplish this, the following skeletal format for modules is offered:

Cover Page
Introduction
Performance Objective
Pre-Assessment
Learning Experiences
Post-Assessment
References

This portion of the monograph was designed to assist the reader in writing a module. Each of the eight functional components has been addressed. In addition, a developmental chart and a critique chart have been provided. Several other monographs in this series provide excellent reinforcement information.

Cover Page Function

In the final analysis, the cover page function must be able to communicate and attract the attention of the learner. This may be collectively accomplished if four basic components are included: title, content table, prerequisites, and directions.

The title communicates active learning by adding an "ing" to the performance element action verb. For instance, the performance element "write a lesson plan" becomes the title "Writing a Lesson Plan." A second opinion, to thrust the title into an action form, is to change the performance element of the performance objective into a question. The performance element "write a lesson plan" might well become "How Do You Write a Lesson Plan?"

The second component of the module cover page should be a content table. It will serve as an advance organizer for the total module. The content table should include a listing of the format pagination. Thereby, a reader could scan the content table and then turn to the specific parts. The content table is important for both the novice who is picking up a module for the first time and for the experienced module user who strives for learning efficiency.

The prerequisites component should also be identified on the cover page. Prerequisites should communicate to the learner the knowledges, skills, and attitudes necessary to enter the module. Basically, the prerequisites should be kept to a minimum, with "no prerequisites" being a very distinct possibility. Prerequisites may be previous modules, a previous course, or a variety of other previous experiences. The ultimate prerequisite should be a statement that enables the learner to decide his/her readiness for the module. If prerequisites are noted, however, the module must test the learner for prerequisite competence.

The directions component should also be provided on the cover page. The directions are learning routes for the learner. Directions are needed, not only on this page, but also at the end of each section within the module. Well-developed module directions will weave the student efficiently toward competence.

Introduction Function

The introduction to a module will usually follow the cover page and serves one primary purpose--to address the problem-solving model question, "Why is it important?" The "why" answer must be evident to the learner upon completion of the introduction. "Why" answers create interest, establish basic assumptions, and encourage the learner to set goals.

The introduction can create interest if it (a) arouses curiosity; (b) is brief, clever, or stimulating; (c) uses visuals; (d) provides expectation of meaningfulness; (e) looks like fun; or (f) creates competition. These characteristics can also be used as a checklist for whether or not interest has been created and if "why" questions have been answered.

Performance Objective Function

Performance objectives must provide the pivotal point for the entire module. Like all performance objectives, the module performance objectives must specify the learner outcomes, identify the conditions under which the performance should occur, and establish assessment standards.

The performance objectives used within a module may be terminal and/or enabling. It is essential that a terminal performance objective be identified, after which it should receive a prominent place following the introduction. Enabling performance objectives may be provided as a process device and usually are clustered in groups of two or more. If the enabling objectives are accomplished, then the terminal performance objective will be accomplished. By indenting the enabling objectives, one may locate enabling performance objectives on the same page with the terminal objectives. Enabling performance objectives are often placed as the headings for learning experience sections.

Pre-Assessment Function

The pre-assessment function is provided in modules for two basic reasons. First, it provides the prerequisite test option. To illustrate, if a module has a prerequisite, then the prerequisite must be tested. The prerequisite may be tested by paper-and-pencil tests or any other means which provide evidence that one has met the module entrance requirements.

The second reason for a pre-assessment is to permit skipping part or all of the module. This pre-assessment option allows the student to

move in jumps or skips throughout the module. The jump or the skip will be based upon demonstrated competence. This option is often called exemption testing. A convenient means of pre-assessment for the total skip option is to utilize the post-assessment as the pre-assessment. The jump and skip options are great motivators and help to make learning efficient.

The pre-assessment function abounds with learning opportunities. It helps the learner make decisions, allows self-pacing, and serves as a learner diagnostic tool. The pre-assessment may also interface with the introduction by arousing curiosity. Finally, one should not be concerned about over-using pre-assessments because they are probably the most natural, non-threatening learning devices available.

Learning Experience Function

Learning experiences provide the real substance of the module, for they permit the learner to accomplish the performance objectives. Learning experiences section, divide, and sequence the learning activities. Learning experiences cannot be undersold as a component of the module. All other module parts merely lead to or assess benefits of learning experiences.

The learning experience section should provide variety. It may be self-contained or directional and should appeal to several senses. The section must include assessment and may require supplemental information sheets. It should be consistent in domain. In other words, the learning experience in a cognitive area should relate to a cognitive performance objective.

The learning experiences may include both crucial and enrichment learning experiences. However, all learning experiences should be action oriented. If these options can be provided within the learning experience section, the section will be a success.

Post-Assessment Function

The post-assessment must test existing competence and facilitate criterion-referencing. It may deliver a "comp-out" option and may diagnose competency voids. Ideally, the post-assessment will close the learning/teaching loop. However, the results of post-assessment may mandate a recycle or dictate that the learner abort the attempt at competence attainment.

The post-assessment function may be simplified if several procedural points are followed. First, sampling may be used for testing knowledges, skills, and attitudes. Second, post-assessment need not

go beyond the levels of the performance objective; and third, it is essential that one test only enough performances and collect only enough data to be satisfied that competence has been achieved. Remember, the post-assessment may be the pre-assessment under conditions specified earlier in the pre-assessment function section of this monograph.

Reference Function

The reference function exists as a finalizing effort within the module. It gives credit for any materials, works, or ideas utilized within the module, thus preventing copyright suits. The reference section identifies special resources needed to satisfactorily complete the module. It provides a listing of resources that would help facilitate the module manager in preparing for execution of the module.

Summary

The functional components of a module have been presented. Writing a module can be a rather simple task when the information provided earlier is mastered. However, the parts of a module should not be written in the same order as they are presented in the module. Figure 3 on page 14 lists the final format and the developmental order for a CBE module. Basic content checks are included. One should bear in mind that this is just one format. There are infinite variations. Figure 4 on page 15 provides a critique system for modules. Note that the system incorporates the problem-solving model.

Critique: System Soft Spots of Modules

The adoption and/or adaptation of an instructional delivery system to incorporate the opportunities of competency-based education (CBE) modules is not without some problems. Exemplary approaches to a CBE module system have been tested in most curricular areas and at most levels. There is no conclusive evidence to indicate that a specific proportion of the content should be delivered with modules. The one best system tends to be situational and dependent upon an optimal learner-teacher-content mesh.

A review of CBE module systems reveals that as little as zero percent or as much as one hundred percent of the content may be delivered with modules. Trite? Yes! True? Yes! However, the early trials have validated the notion that some content and some students are best accommodated by traditional group-oriented approaches.

The decision maker would be well advised to seek learning experiences which appeal to as many senses as possible. This advice

Format and Development of CBE Modules

FINAL FORMAT	DEVELOPMENTAL ORDER
COVER PAGE	-
title	7
content table	10
prerequisites	2
directions for module	9
INTRODUCTION	4
answer "why"	-
PERFORMANCE OBJECTIVE - TERMINAL	1
optional enabling performance objective(s)	-
PRE-ASSESSMENT	-
test prerequisites	3
skip option	6
LEARNING EXPERIENCES	5
module substance	-
development of learner	-
POST-ASSESSMENT	6
test exit	-
criterion-referenced content	-
REFERENCES	8
credits	-
unusual resources	-

HINT: Take at least seven sheets of paper and label each sheet with one of the above headings. Do what is required for each heading in the order listed under the DEVELOPMENTAL ORDER. When you have completed the first eight steps, shift your papers into the FINAL FORMAT and then write your directions and content table. Naturally, the number of module pages will vary. You will, no doubt, desire to revise after this point. Good luck!

Figure 3

CBE Module Critique

WHERE IS THE LEARNER?

Yes=2 Maybe=1 No=0

1. Title communicates
2. Prerequisites clearly stated
3. Testing options defined

WHERE IS THE LEARNER GOING?

1. Development of knowledge, skill, or attitude evident in title
2. Directions to next section evident at end of each section
3. Development of knowledge, skill, or attitude evident in performance objective

WHY IS THE LEARNER GOING?

1. Goal seeking promoted
2. Interest aroused in introduction
3. Each module section related to other sections

HOW IS THE LEARNER GOING TO GET THERE

1. Conditions for performance evident in performance objective
2. Sufficient number of learning activities to deliver on performance objective
3. Learning activities appropriate

WHEN IS THE LEARNER THERE?

1. Measurement of performance facilitated
2. Pre- and post-tests available when required
3. Tests are criterion-referenced

COLUMN TOTALS

COMPOSITE CRITIQUE SCORE

MODULE RATING

28-30 Ready for tryout

23-27 Minor revision needed

16-22 Major revision needed

8-15 Parts may be useful

0-7 Forget this one

Figure 4

thereby encourages directional modules supported with at least audio, visual, and printed materials.

The adoption decision should be made easier if two general rules of thumb are remembered. First, about one-third of the learners prefer group-oriented instruction; another one-third of the learners prefer individual-oriented instruction; and the final one-third of the learners have no preference and therefore are successful in either approach. Second, a predictable proportion of content is best learned in a setting where free exchange of ideas and group synthesis can flourish. This content should probably not be delivered via modules.

While the two rules of thumb are helpful in making the initial decision to use CBE modules, more information is required to effectively diagnose or prevent operational problems within the system. The following eight soft spots are highlighted in an effort to facilitate an orderly critique of a CBE module delivery system.

Performance Objectives

The most important component and, consequently, the first thing to check in a CBE module system is the performance objective. The performance objective(s) must (a) communicate the parameters for the course; (b) break down the content; and (c) specify conditions, performances, and standards for evaluation. The absence, weakness, or inappropriateness of a performance objective is sure to cause a soft spot in the system. The monograph on performance objectives should assist in fine-tuning this component.

Sequence

Care must be exercised to insure that the content is appropriately sequenced. A natural order of content will usually evolve if the instructor attends to this task. Content can be ordered by chronology, complexity, or a frequency priority. The sequencing must account for prerequisite competence and cruciality. The latter is most critical for occupational courses and should be tested against job-entry level criteria and performance objectives should it be used to sequence CBE content. The monographs on performance objectives and performance goals should prove helpful in addressing this task.

Learning Activities

Too few or inappropriate learning activities will lead to certain disaster for the student and the system. The learner must acquire knowledge, skill, and affective requisites. If there is insufficient opportunity or if the learning activities are "busy work," the system

will not deliver. Earlier components of this monograph and the monograph on learning activities should be consulted for specific direction.

Structure

While this monograph addresses the structure of a module, the structure of the course is also crucial. The structure extends beyond the module and the sequence of the content. The learner must be able to grasp the broad picture of the course, accept the approach, and be confident that certain things will happen within a predetermined timeline. The monograph related to the syllabus should provide the necessary background information to facilitate an appropriate structure.

Monitorship

Students react differently to modules. A first-time user of a module will probably be frustrated. The instructor must relieve the frustration for optimal learning. Another student, often times labeled as a perfectionist, may well over-invest in a module. This student needs and deserves attention from the instructor. A third student may procrastinate and thereby get caught in the time crunch. This student must be prodded. The learner problems coupled with content problems noted earlier require the instructor to be a system monitor. The monographs on motivation and remediation are valuable in preventing or correcting this soft spot. In the final analysis, students must learn how to use modules.

Affective Attention

The easiest modules to develop are probably in the cognitive and psychomotor areas. However, the crux of employability and the core of learning enjoyment reside in the affective area. The system must address directly or on an integrated basis the affective aspects of the competence. An ebbing learner morale is symptomatic of too little or inappropriate affective attention. The affective attention must relate to both the process and outcome of learning. Refer to the monograph on affective performance. Affective learning is probably the most fertile potential for educational excitement.

Grades

The translation of learner performance is usually done by grades. Grades may be coded as letters, numbers, or printout pages. Whatever the code, the learner deserves to know the translation

rules. Whether one likes it or not, the learner will be positively or negatively reinforced by the performance translation. It is a myth that the learner is neutral! The instructor should attend to the process of performance translation. The monograph on evaluation coupled with the syllabus monograph should firm up this soft spot.

Module Management

The module must become the vehicle to bond the learner to content. It speaks for the instructor. On-the-spot remediation and clarification options are not available from the instructor. Thus, the module must be available to the learner and contain accurate content. This should not serve to frighten instructors from adopting a CBE module system or from adapting parts of the instruction to the system. Adhering to the notions of availability and content accurateness are all that needs to be done. The other portions of this monograph address this requirement.

Application: Management of Modules

The management of a total or partial module system requires different knowledges, skills, and attitudes from instructors. Instructors and/or administrators who are prone to resisting change will probably not see the benefit of a module delivery system. If this system is forced on an unwilling staff, the overall quality and efficiency of the instructional program may decline.

This section of the monograph provides twelve guides for the application and management of a module system. These guides are not all-inclusive but are intended as a supplement to the other information in this monograph. They may be revised to fit your special needs.

Set Content Parameters

The first and most important activity, establishing the limits of the content, can most easily be done by accepting a given group of performance objectives. The objectives should be accepted for a definite period of time and subjected to careful scrutiny before additions, reductions, or revisions are made. The performance objectives should be standardized, be of a terminal nature, and be made public. This will establish, for all to know for a given period, what must be taught and learned.

Codify Performance Objectives

The performance objectives accepted should be labeled to promote

use in the delivery system. Instructors, with the help of appropriate experts, should assign crucial or enrichment status to each performance objective. The performance objectives should then be ordered in a logical sequence based upon prerequisites.

Designate Delivery Strategy

Each performance objective should be reviewed to determine the optimal learning/teaching strategy. This decision will vary, dependent upon factors identified earlier in this monograph. A priority list should be developed to determine which performance objective should be addressed first, second, etc., in a module approach. This should solve the problem of which performance objectives should be addressed by a module and establish a module writing priority.

Adapt Learning Environment

The instructor should make various decisions about the learning environment at this point--not before. The instructor may decide that the schedule and facilities are already satisfactory or that a change in schedule or facility is not possible. In either event, the instructor should proceed accordingly. However, if adaptation is needed and appears possible, then appropriate proposals and changes should be made. The optimal situation would include access to classrooms, well-equipped laboratories, computer management, and the world of work. It also would have a barrier-free scheduling system that promoted open entry-open exit on the part of the learner. Most instructors will have to compromise. Don't spend time or energy trying to change what can't be changed. Go for the big payoffs and be willing to lose a few battles to win the war.

Orient Faculty

Design a short and snappy written description of the learning/teaching approach and release it to peers and administrators. This will prevent surprises and limit non-productive rumors. The material will also assist in flushing out misgivings on the part of the instructional team.

Orient Students

A module will shift the responsibility for content from the instructor to the module. It will also place the responsibility for learning squarely on the shoulders of the learner. Since this approach is new to most students, they need to know the rules of the new approach. The syllabus and some group discussion are needed for clarification.

Purchase Modules

There is no need to rediscover the world. Various commercial modules are already on the market and the quality improves each year. Buy it if you can afford it and if you can make good use of it. You may need to make some modifications for your setting. That's okay since it is usually easier to revise than to create.

Develop Module(s)

The steps and procedures are included in this monograph for writing a module. Try it. You'll probably have your best luck with a directional module. Try it out and revise it. Look around and determine if you can share and trade modules with peers. Start with one—don't feel the whole system must go modular! Most experienced module writers can put together a directional module faster than they can write a lesson plan.

Solicit Student-Written Modules

Teaching is still one of the best ways of learning. Be alert to appropriate situations that lend to having a student develop a module. The upfront student and an enrichment performance objective set the stage. Experience has shown that this monograph section on "Development: Parts of a Module" is all that most students need in order to proceed. Be sure to give credit to the student if you later incorporate the module into the program. This provides some real spin-off benefits for instructor/learner rapport.

Design Monitor System

The instructor and the student should know, at any time, which performance objectives have been addressed and which remain to be addressed. A meshing of the performance objectives to a calendar will handle this problem. It can be as simple or as elaborate as one wishes. In any event, it should require no more time or resource investment than has been traditionally given to keeping a grade book. The syllabus should help communicate the monitoring system. Some super computer-assisted management systems have been designed and tested.

Set Time Frames

Although open entry-open exit may be the ideal, facilities and schedules often preclude the ideal. Directional modules using a laboratory set-up will often have to be limited. A reasonable approach to a facility dependent module is probably two weeks. This

will permit the student to fail once and still have a one-week grace period. It is dangerous to set an absolute without taking into account the specific performance objectives and attendant learning/teaching requirements. The key is to communicate the time frames in advance to the learner.

Close Loop

The system should be evaluated, adjusted, and re-engaged. This approach will close the loop and promote refinement of the learning/teaching delivery system. Instructors will probably never be completely satisfied. This is good. Instructors, however, will probably find it much easier to revise a portion of their module-oriented courses than they found in the traditional, group-only approach.

Outreach: Support References on Modules

The information provided in this monograph probably will not provide all the answers needed to implement a module learning/teaching approach. Further, the monograph may not provide enough new information to revise an existing module learning/teaching approach. Therefore, feel free to reach out and review other information. One should find excellent help in the other monographs in this series. Further, one might find the documents noted below to be helpful.

Finch, C. R. and Crunkilton, J. R. **Curriculum Development in Vocational and Technical Education**. Boston: Allyn and Bacon, Inc., 1979.

The book is a recent and comprehensive treatment of curriculum development in vocational and technical education. Emphasis was given to planning, content, and implementation. The section dealing with implementation includes chapters entitled: "Identifying and Selecting Curriculum Materials," "Developing Curriculum Materials," "Individualized, Competency-Based Packages," and "Evaluating the Curriculum."

The content of the book is supplemented with numerous figures, tables, and practical examples. The composite work of this book presents an organized approach toward vocational and technical education curriculum development and implementation. The book is a valuable resource and reference.

_____. **PTBE Modules**. Athens, Georgia: American Association for Vocational Instructional Materials, 1978. (Engineering Center - University of Georgia, 30602, Phone: 404-542-2586)

This is a collection of 100 written modules written to facilitate the professional development of vocational and technical education instructors. The materials were developed from a research project executed at The National Center for Research in Vocational Education. The modules have evolved from a systematic development, testing, revision, and refinement process. Each module is illustrated and supplemented with current references. The module format and approach are consistent with information presented in this monograph.

Although the collective set of modules is designed as a complete pre-service instructional program, a selection of modules can be made which is thematic with this monograph. The titles of the modules which relate to this monograph are listed below.

Select Student Instructional Materials

Prepare Learner-Made Instructional Materials

Employ Simulation Techniques

Direct Student Laboratory Experience

Individualize Instruction

Present Information with Modules, Real Objects, and Flannel Board

Employ Programmed Instruction

The previous modules, and perhaps others from the collection, should provide an outstanding complement to this monograph. The modules are action oriented, consumable, and cost about \$3.00 each.

Postlethwaite, Novak, and Murray. **The Audio-Tutorial Approach to Learning**. Minneapolis: Burgess Publishing Company, 1972.

This book is a description and prescription for audio-tutorial learning. It provides a continuing record of the system initiated in 1961 by Dr. Postlethwaite for the instruction of Biology at Purdue University. This system has sustained eighteen years of operation and has been replicated by untold other universities and community colleges.

The book provides an excellent philosophy for A-T learning and teaching. The materials are generously bolstered with "how to" information and examples of support operational forms and check sheets. One should expect to find many new ideas in this document. The book is an absolute "must" for institutions desirous of moving toward a module learning/teaching approach with content dependent upon delivery in a laboratory setting. Although the book is a few years old, it still provides excellent direction for contemporary opportunities in module-oriented learning and teaching.

Summary: Modules in Perspective

Modules are compact instructional devices designed to guide learning and teaching.

Modules are vehicles which permit capitalization of contemporary educational concepts.

Modules facilitate a communication system rooted in traditional educational tools.

Modules are plans for learning/teaching which can be written by the instructor or learner.

Modules are parts of a system that possess their own inherent soft spots.

Modules permit a learning/teaching approach that can and must be managed.

Modules create alternatives for learning/teaching.

Modules mandate different behavior from teachers.

Modules can mirror instructor creativity.

Modules can make learning/teaching more fun.

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